

1969

**OPERATING
SUMMARY**

SAULT STE. MARIE

water pollution control plant

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JUN 26 1970

ONTARIO WATER
RESOURCES COMMISSION

ONTARIO WATER RESOURCES COMMISSION

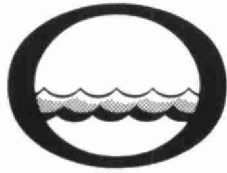
Division of Plant Operations

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Water management in Ontario

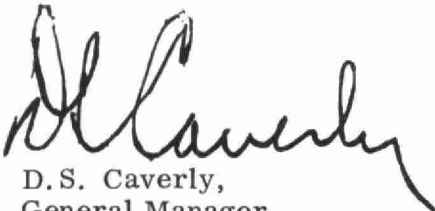
Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario

The operating efficiency and financial status of the water pollution control facilities operated for you in 1969 are presented in the following pages.

The regional operations engineer's comments and the statistical data will assist you in gauging the plant's level of performance. A new flow chart and up-to-date design data are also provided.

Various divisions and sections within the Commission have co-operated in providing what we trust is an accurate and concise annual operating summary.


D.S. Caverly,
General Manager.


D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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ONTARIO WATER
RESOURCES COMMISSION

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SAULT STE. MARIE
water pollution control plant

operated for

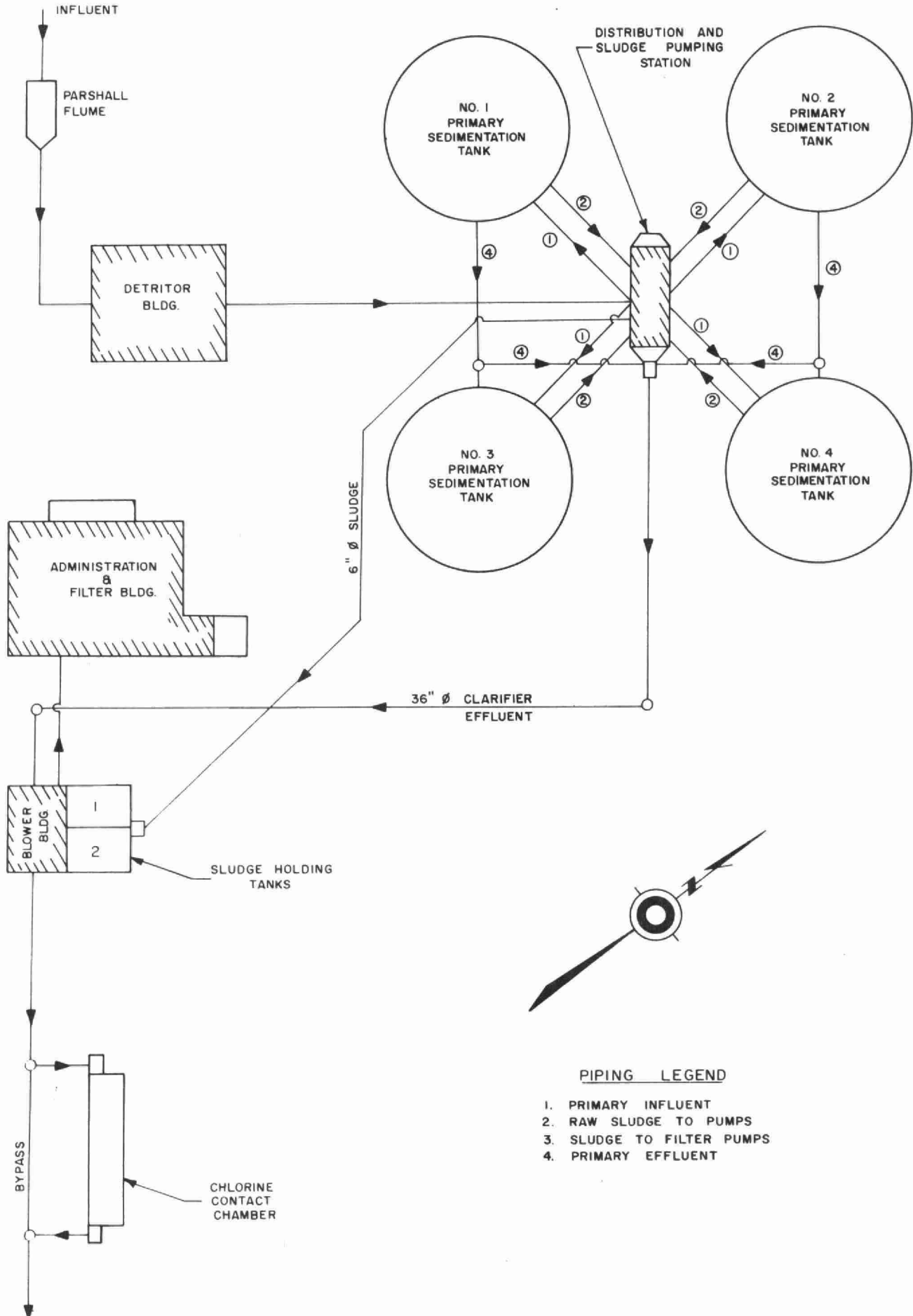
THE CITY OF SAULT STE. MARIE

by the

ONTARIO WATER RESOURCES COMMISSION

1969 ANNUAL OPERATING SUMMARY

SAULT STE. MARIE WATER POLLUTION CONTROL PLANT FLOW DIAGRAM



DESIGN DATA

PROJECT NO.	2-0020-58	TREATMENT	Primary
DESIGN FLOW	8.0 mgd	DESIGN POPULATION	72,500
BOD - Raw Sewage	250 mg/l	SS - Raw Sewage	200 mg/l
- Removal	35%	- Removal	60%

PRIMARY TREATMENT

Comminution

Type: Barminutor
Size: Two Model C (36")

Grit Removal

Type: Dorr detritor
Size: Two 18' x 18' x 1'3" (6,240 gal)
Retention: 1.13 min
Flow Velocity: 0.209 fps

Primary Sedimentation

Type: Dorr
Size: Four 70' dia x 8' swd (900,000 gal)
Retention: 2.3 hr
Loading: Surface, 520 gal/ft²/day
Weir, 13,000 gal/ft/day

CHLORINATION

Type: W & T
Size: One 800 lb/day

Chlorine Contact Chamber

Size: One 60' x 20' x 12' (90,000 gal)
Retention: 16.2 min

OUTFALL

- to St. Mary's River

SLUDGE HANDLING

Holding Tank - Aerated

Size: Two 24' x 15' x 11½' (8,280 cu ft
or 51,600 gal)
Air Supply: One Sutorbilt

Vacuum Filter

Type: Komline-Sanderson
Size: Two 200 sq ft

PUMPING STATIONS

Pim Street Pumping Station

Type: Worthington
Size: One 10,000 gpm @ 50' tdh (diesel)
Two 6,300 gpm @ 40' tdh (electric)

Clark Creek Pumping Station

Type: Worthington
Size: One 12320 gpm (electric)
One 13000 gpm (diesel)
Two 7000 gpm (electric)
One diesel generator

Wiita Pumping Station (Temporary)

Type: Smart-Turner
Size: 2400 gpm @ 30' tdh (electrical)

'69 REVIEW

GENERAL

Although the total flow for 1969 did not increase appreciably over the 1968 flows, efficiency increased by eight percent for BOD reduction and nine percent for suspended solids reduction.

The Clark Creek pumping station was renovated during the year. A new 12,320 gpm electrically driven pump was installed. Included in the renovation was the addition of a diesel generator to operate the new pump or the two 7,000 gpm pumps during power failures. The smaller pumps were modified to allow them to operate while the larger pump was in use. A 13,000 gpm diesel-operated pump is used as a stand-by for emergencies.

Grease at Clark Street pumping station was a problem throughout the year. Mortzene was used in an attempt to control the problem, but results from the tests were inconclusive.

The Division of Research studied the effects of adding lime to the plant flow in an attempt to remove phosphates. Results of this study have not been enumerated to date.

A firm of consulting engineers was hired to report on the existing plant, expected future flows and expansion requirements.

EXPENDITURES

The total operating cost of treating 3162.7 million gallons of sewage during 1969 was \$146,194.04. It cost \$46.22 to treat one million gallons of sewage, and 11 cents to remove one pound of BOD.

Payroll, sundry and power accounted for 85% of the total operating costs.

PLANT FLOWS AND CHLORINATION

The total flow to the plant in 1969 was 3162.7 million gallons. The average daily flow was 8.7 million gallons, while maximum and minimum daily flows were 16.0 and 5.7 million gallons respectively.

The plant effluent was chlorinated on a seasonal basis. During the six

months from June to December, 75,295 lbs. of chlorine were used at an average dosage of 4.6 mg/l. This gave an average of 39.9 lbs. of chlorine used per million gallons of sewage treated during the six-month period.

PLANT EFFICIENCY

The average influent BOD and suspended solids were 94 mg/l and 112 mg/l respectively. The average effluent BOD and suspended solids were 53 mg/l and 51 mg/l, giving an average removal of 44 percent BOD and 54 percent suspended solids.

A total of 2585 cubic feet of grit was removed during the year. This gave an average removal of 0.82 cubic feet of grit removed per gallon of sewage treated.

VACUUM FILTRATION

The filters were in use an average of 194 hours per month. The sludge to be filtered contained an average of 5.7 percent total solids, while the filter cake contained an average of 25 percent total solids and the filtrate only 0.7 percent total solids. The average yield was 7.3 lbs/ft/hr.

CONCLUSIONS

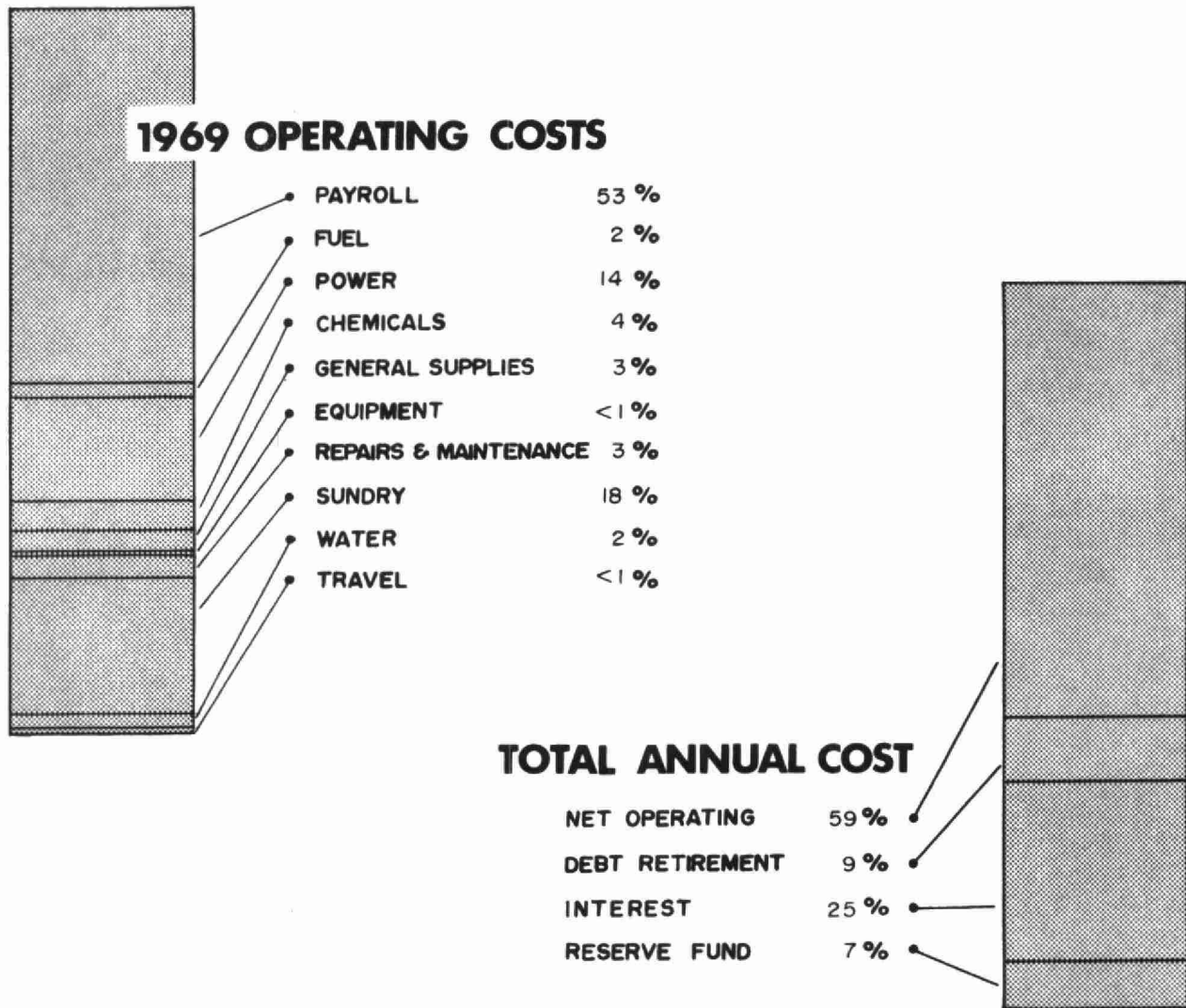
1. The average daily flow to the plant exceeded the plant's design capacity for seven of the 12 months. From the charts, it can be seen that the flow has remained the same as in 1968, and at least 51 percent of the time the flow was equal to or greater than the design capacity.
2. The average concentration of BOD in the raw sewage increased, while the average concentration of the suspended solids decreased from the previous year. This resulted in a decrease of concentration of BOD and suspended solids in the final effluent (i.e. a greater percentage BOD and suspended solids removed.)
3. The vacuum filtration process remained almost the same, with the same yield. Minimal amounts of polymers were added in 1969, again reducing the cost of operation while maintaining a high efficiency.
4. From the tabulated BOD results, it appears that the City is having some measure of success with its combined sewer separation program. The increase in population has resulted in an increase in BOD, and has maintained the hydraulic overloading of the plant.

PROJECT COSTS

NET CAPITAL COST (Final)		\$3,244,149.35
DEDUCT - Payments from Municipalities	\$ 2,900.00	
- Portion financed by CMHC/MDLB (Final)	<u>2,145,572.61</u>	<u>2,148.472.61</u>
Long Term Debt to OWRC		<u>\$1,095,676.74</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969		\$ <u>223,074.41</u>
Net Operating		\$ 146,194.04
Debt Retirement		22,111.00
Reserve		16,585.60
Interest Charged		<u>61,341.30</u>
TOTAL		\$ <u>246,231.94</u>

RESERVE ACCOUNT

Balance @ January 1, 1969	\$ 143,462.65
Deposited by Municipality	16,585.60
Interest Earned	<u>7,683.76</u>
	\$ 167,732.01
Less Expenditures	<u>29,000.00</u>
Balance @ December 31, 1969	\$ <u>138,732.01</u>



Yearly Operating Costs

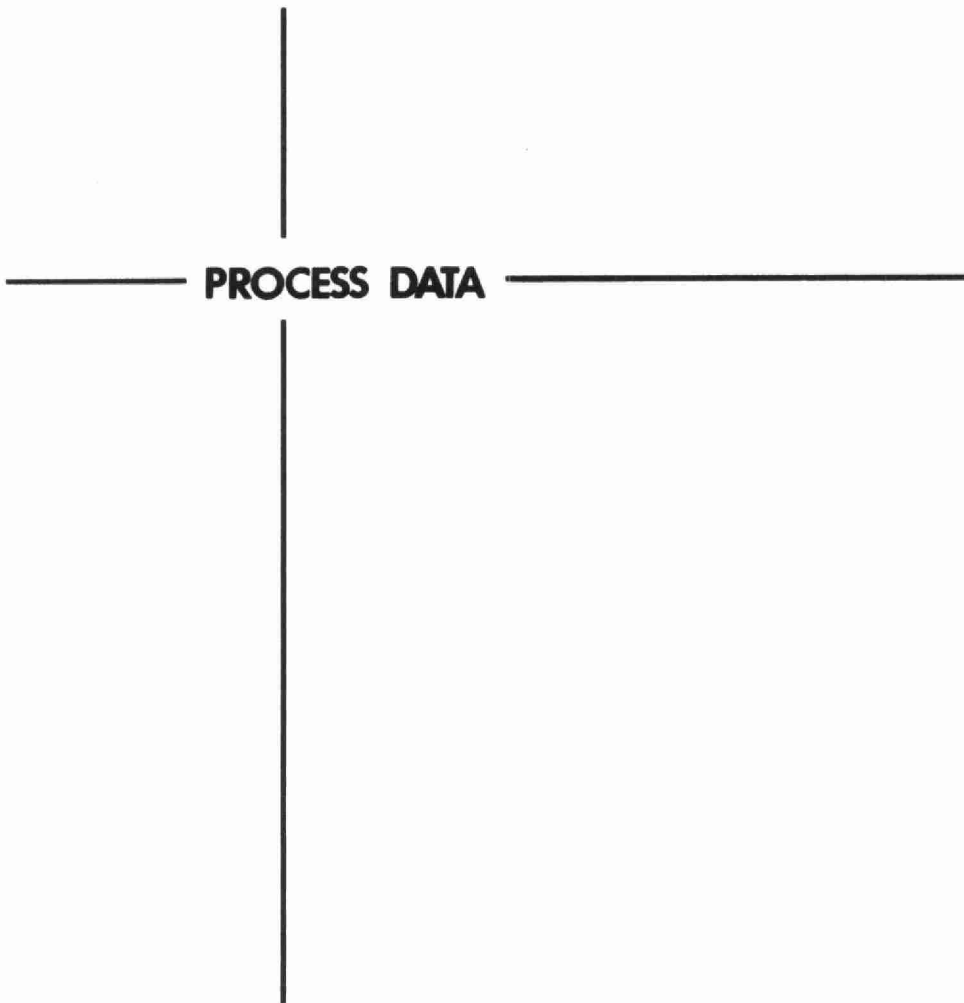
YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1965	2831.10	\$122,349.41	\$43.22	7 cents
1966	2668.91	126,102.15	47.25	11 cents
1967	2796.57	135,741.58	48.54	17 cents
1968	3196.10	136,641.46	42.75	14 cents
1969	3162.70	146,194.04	46.22	11 cents

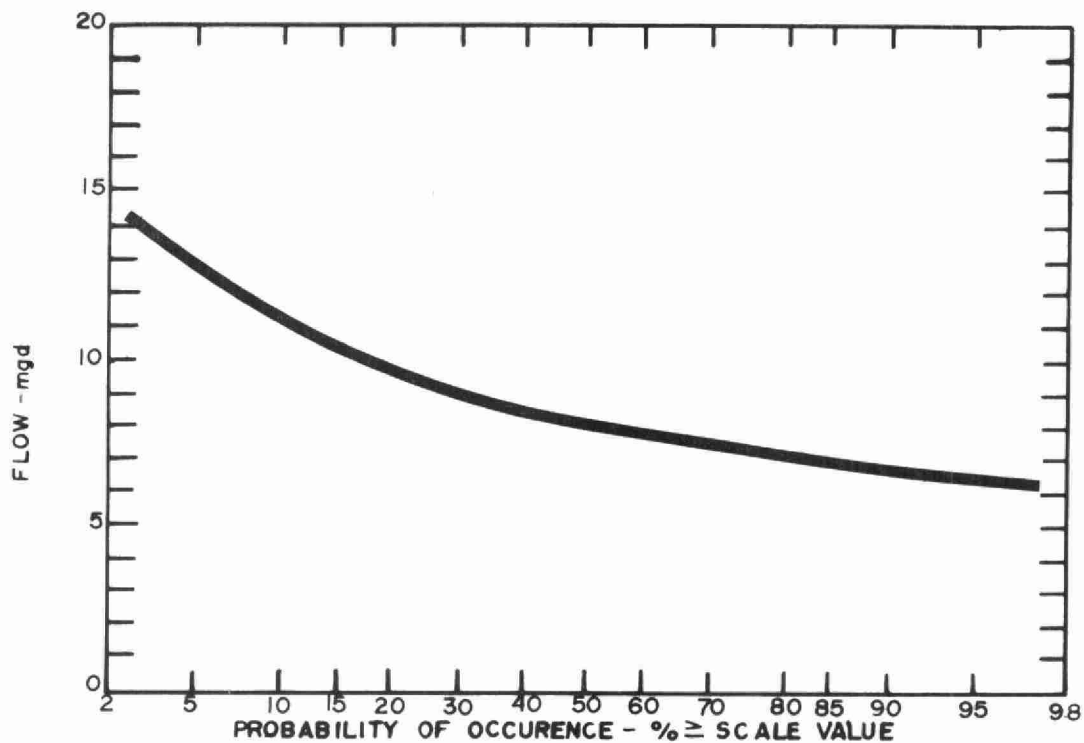
Monthly Operating Costs

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAY ROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER	TRAVEL
JAN	10040.11	8561.54	-	143.77	1117.78	-	80.40	-	-	97.83	38.79	-
FEB	8969.83	5732.19	-	252.75	1728.97	137.34	540.11	-	222.73	190.57	144.10	21.07
MAR	9116.76	5731.08	-	337.47	827.10	-	138.82	-	84.97	1862.72	134.60	-
APRIL	11467.86	5822.58	-	255.93	3555.87	-	337.62	189.21	32.33	1090.31	184.01	-
MAY	11206.95	6552.72	-	282.76	1083.71	2352.26	370.96	-	138.94	171.90	118.66	135.04
JUNE	10407.28	6049.33	-	100.20	2524.79	-	359.79	-	74.31	1145.02	123.68	30.16
JULY	12071.46	5790.70	649.95	157.66	-	375.64	183.90	48.42	2404.00	2128.62	159.77	172.80
AUG	17074.13	8570.85	795.60	65.37	3795.28	1600.20	412.99	-	219.88	926.64	687.32	-
SEPT	20533.42	5714.59	57.99	93.75	719.46	220.50	573.60	-	-	12811.41	286.12	56.00
OCT	11753.20	5916.96	-	-	1164.57	1600.20	331.84	-	252.14	1793.98	674.63	18.88
NOV	6742.10	5151.42	-	109.49	705.31	(238.61)	258.21	-	-	191.96	392.32	172.00
DEC	16810.94	5265.80	682.24	619.08	3271.72	375.65	1152.43	-	802.08	4036.94	605.00	-
TOTAL	146194.04	74859.76	2185.78	2418.23	20494.56	6423.18	4740.67	237.63	4231.38	26447.90	3549.00	605.95

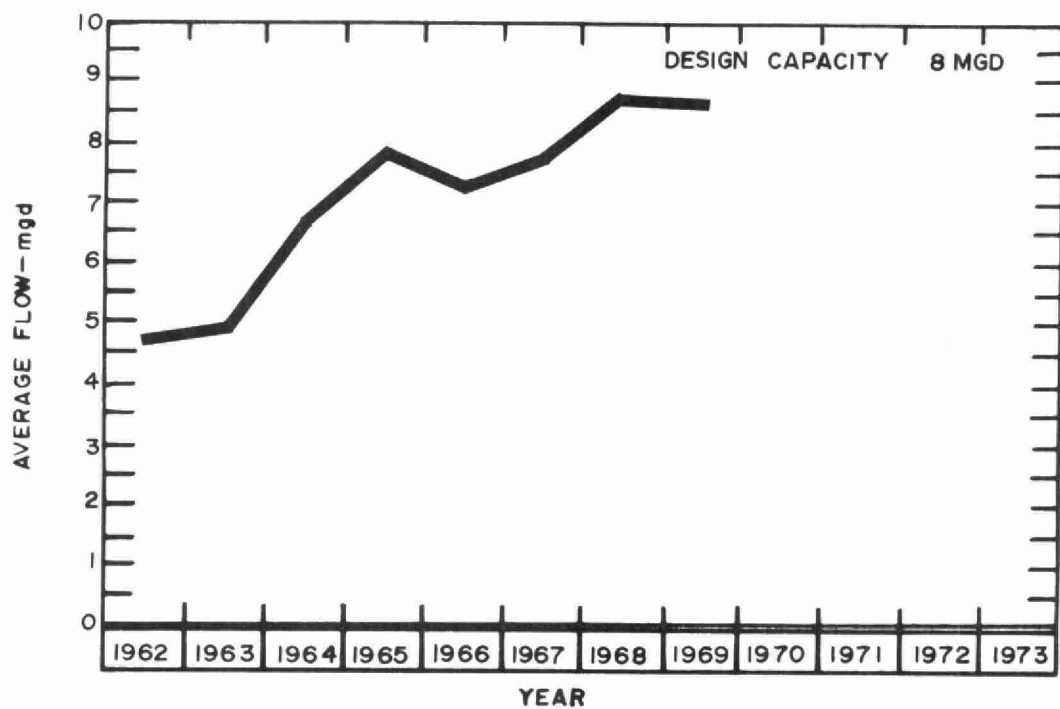
*SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE \$9499.80

BRACKETS INDICATE CREDIT





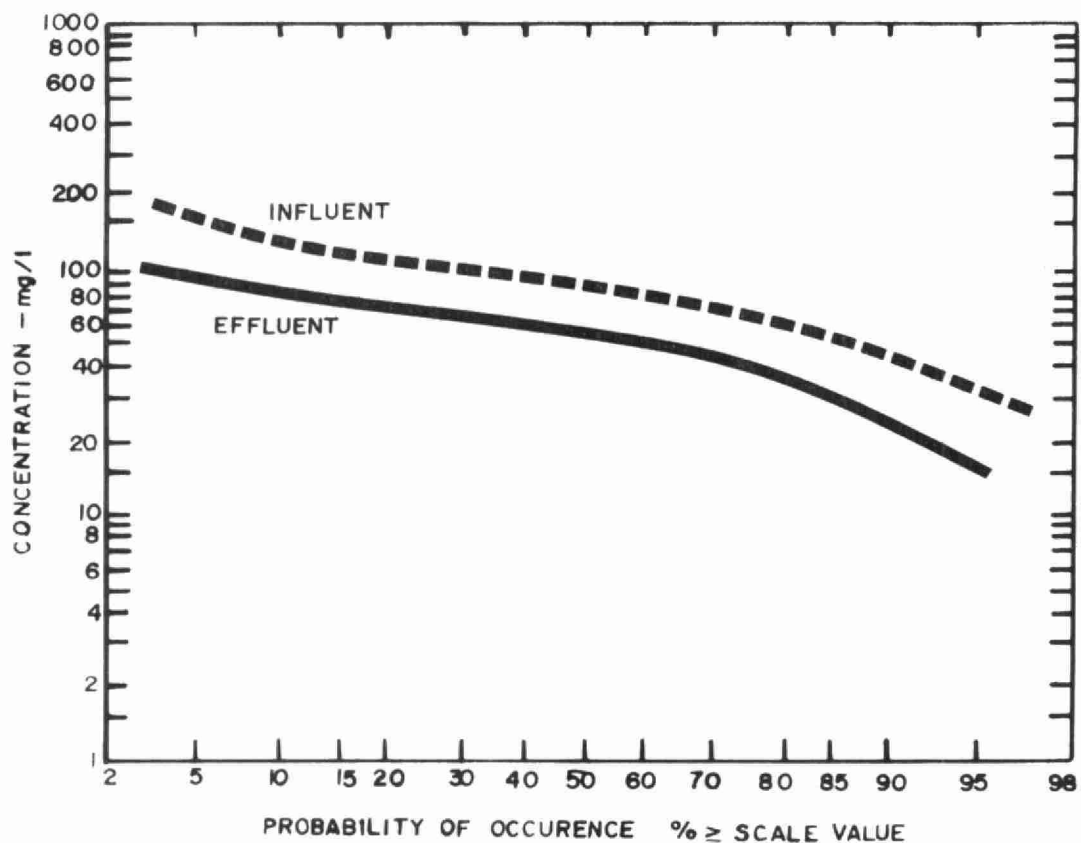
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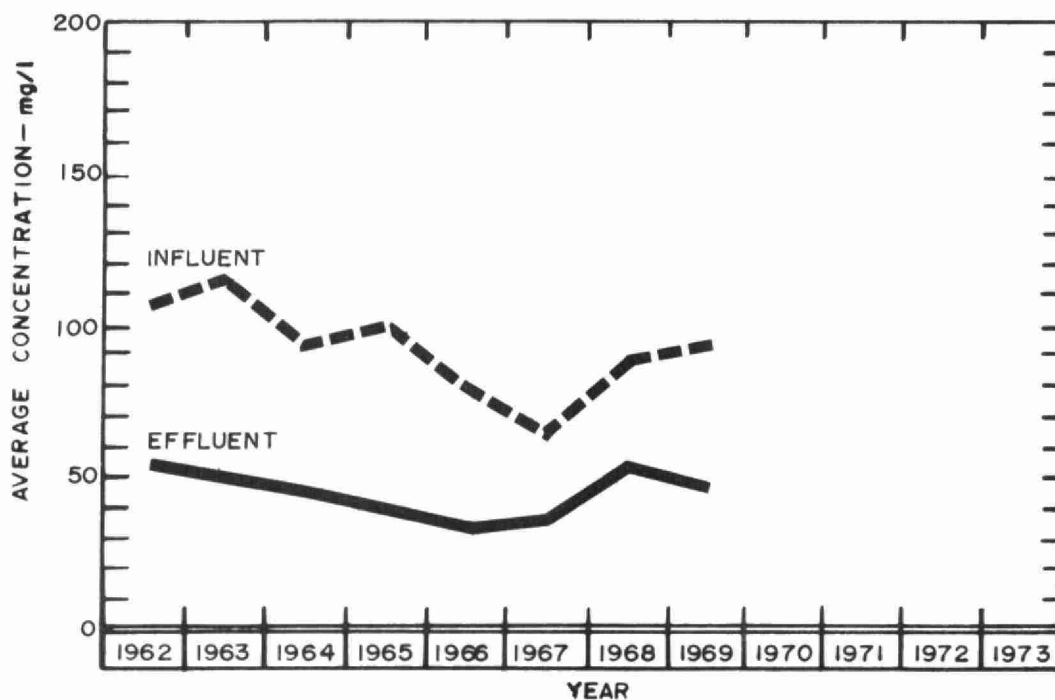
PLANT FLOWS and CHLORINATION

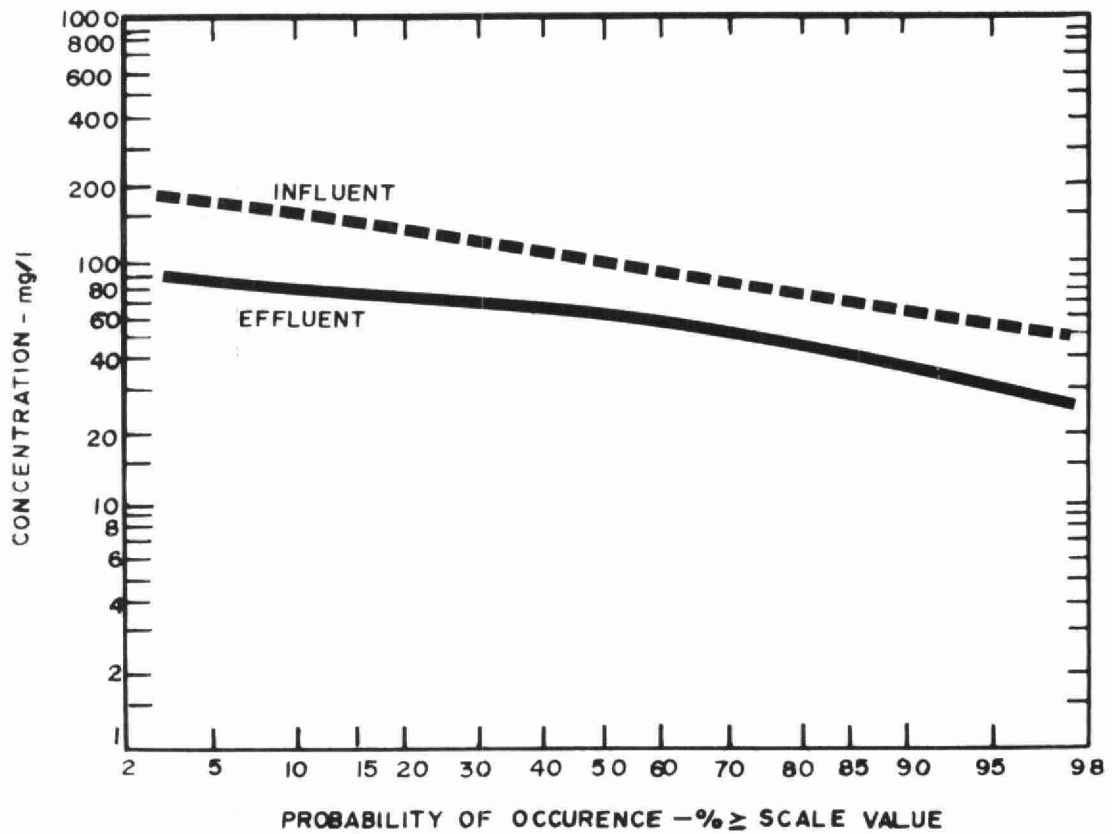
MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED 10 ³ pounds	DOSAGE mg/l
JAN	243.7	7.9	16.0	6.9	0	0
FEB	190.7	7.1	8.1	6.6	0	0
MAR	278.8	9.0	11.3	7.1	0	0
APR	299.8	10.0	15.1	7.0	0	0
MAY	260.5	8.4	10.7	7.0	0	0
JUNE	296.4	9.9	14.5	7.5	9.6*	3.2
JULY	282.6	9.1	11.7	7.5	13.3	4.7
AUG	258.4	8.3	11.2	6.6	12.7	4.9
SEPT	201.5	6.7	9.0	5.7	13.2	6.6
OCT	319.0	10.3	14.5	6.2	13.4	4.2
NOV	304.0	10.1	15.0	8.2	11.2	3.7
DEC	227.3	7.3	8.8	6.5	1.8*	4.4
TOTAL	3162.7	-	-	-	75.2	-
AVERAGE	-	8.7	-	-	12.5	4.6

* Chlorination practiced from June 6 to December 5

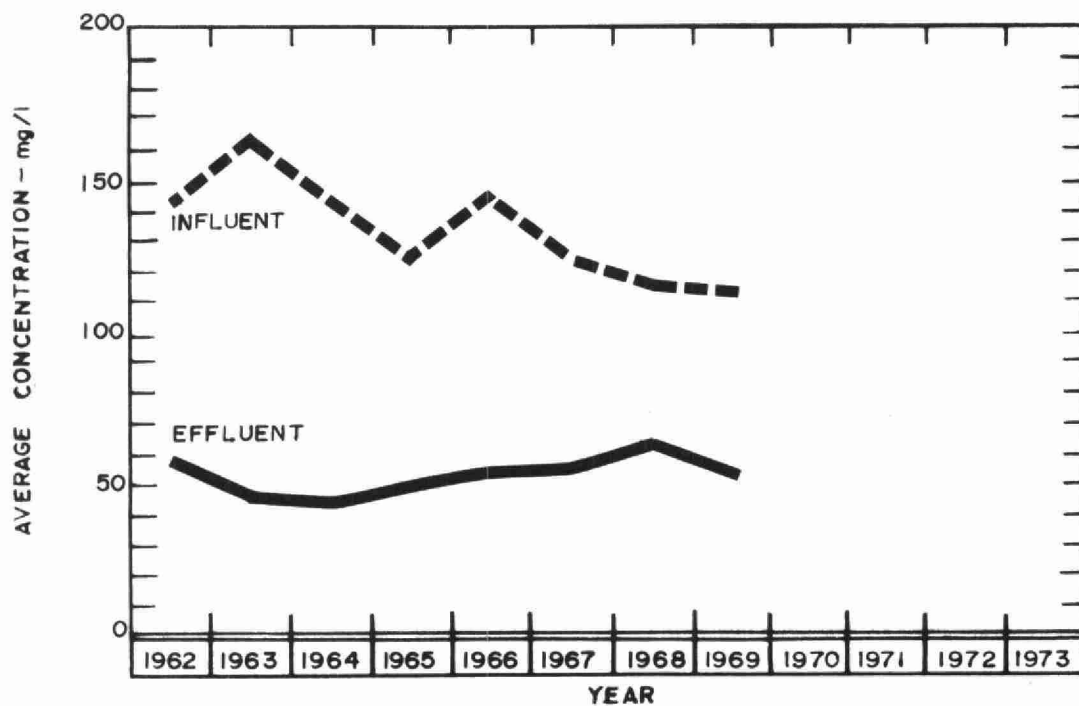


BIOCHEMICAL OXYGEN DEMAND



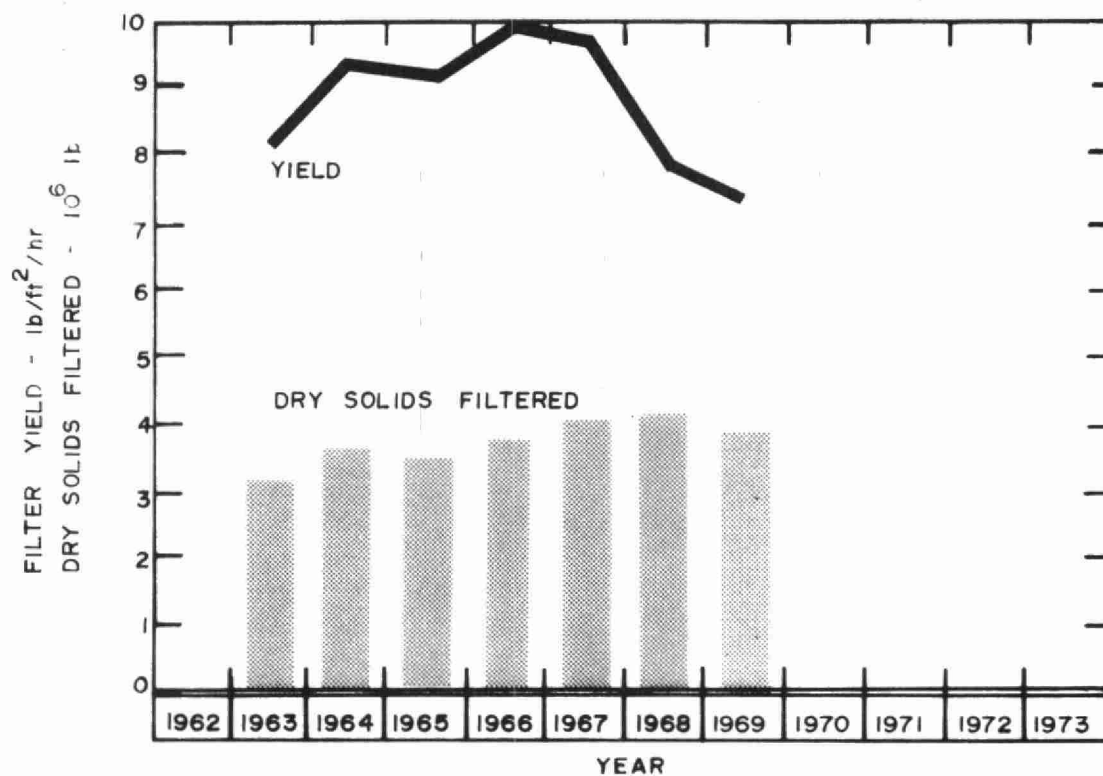


SUSPENDED SOLIDS

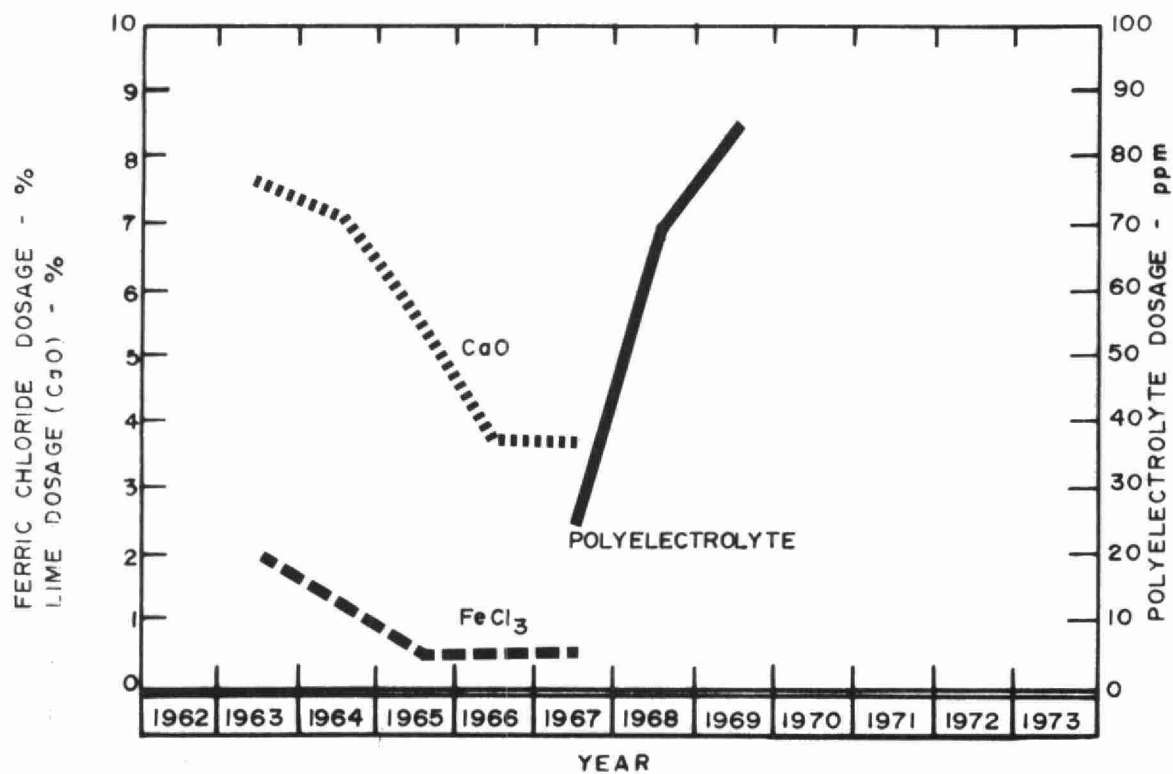


PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT REMOVAL
	INF. mg/l	EFF. mg/l	REDUCTION		INF. CONCN mg/l	EFF. CONCN mg/l	REDUCTION		
			%	10 ³ pounds			%	10 ³ pounds	cu
JAN	97	66	32	75.	102	46	55	136.	262
FEB	121	77	36	83.	103	40	61	120.	218
MAR	80	50	38	83.	98	44	55	151.	237
APR	68	39	42	87.	103	46	55	171.	355
MAY	104	60	42	115.	118	52	56	172.	116
JUNE	83	50	40	98.	104	57	45	139.	199
JULY	67	40	40	76.	90	40	56	141.	352
AUG	69	36	48	85.	132	42	68	232.	270
SEPT	117	76	35	83.	125	62	50	127.	155
OCT	63	40	37	73.	146	74	49	230.	287
NOV	161	46	71	350.	109	55	55	164.	67
DEC	99	60	39	89.	113	48	48	148.	67
TOTAL	-	-	-	-	-	-	-	-	2585
AVERAGE	94	53	44	108.	112	51	54	161.	215



VACUUM FILTRATION



VACUUM FILTRATION

MONTH	TOTAL FILTER USE hr	SLUDGE		CONDITIONING CHEMICALS						FILTER CAKE % TS	FILTR. % TS	YIELD lb/hr sq ft
		TOTAL SOLIDS %	DRY SOLIDS 10 ³ lb	CaO		FeCl ₃		POLYMER				
				USED 10 lb	DOSE %	USED 10 lb	DOSE %	USED lb	DOSE ppm			
JAN	219	5.3	357	0	-	0	-	0	-	23	0.3	7.0
FEB	168	5.2	349	0	-	0	-	0	-	23	0.4	7.9
MAR	190	5.4	326	0	-	0	-	0	-	24	0.4	7.5
APR	164	5.3	268	0	-	0	-	0	-	24	0.5	7.5
MAY	186	5.5	291	0	-	0	-	0	-	24	0.6	7.2
JUNE	190	5.5	316	0	-	0	-	1.3	84*	28	0.8	7.4
JULY	226	6.3	366	0	-	0	-	0	-	28	0.7	7.3
AUG	171	6.3	293	0	-	0	-	0	-	28	1.0	7.4
SEPT	216	6.7	364	0	-	0	-	0	-	26	1.2	7.3
OCT	240	6.1	426	0	-	0	-	0	-	24	0.8	6.4
NOV	165	5.6	257	0	-	0	-	0	-	25	0.7	7.1
DEC	189	5.0	299	0	-	0	-	0	-	23	0.4	7.2
TOTAL	2324	-	3912	0	-	0	-	1.3	-	-	-	-
AVERAGE	194	5.7	326	0	-	0	-	0	-	25	0.7	7.3

* Denotes dosage when used



Date Due

[illegible]



Water management in Ontario